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J. Orne Green.

R E P O R T

ON THE

PROGRESS OF OTOTOLOGY,

FOR

1869-'70.

BY

J. ORNE GREEN, M. D.,
OF BOSTON.

[REPRINTED FROM TRANSACTIONS OF THE AMERICAN OTOLOGICAL
SOCIETY, SESSION 1870.]



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THE large number of articles which have appeared during the last year in the journals of Germany, France, and America, show the still increasing interest which diseases of the ear are exciting in the minds of the profession. The result has been a great addition to our knowledge of the pathology of these diseases. While dissection of the minute parts was, till within a short time, comparatively rare, the last year has added a large number of minute and careful observations, which show us the course of disease, and suggest the appropriate treatment; and, although the result of these dissections has often demonstrated the dangerous nature of some diseases, the histories of the cases should only impress upon us the necessity of attending carefully to the earlier and less severe symptoms. Our advance in the treatment of aural disease is exactly commensurate with our advance in its pathology, and, even if no new therapeutic agents had been discovered, our increased knowledge of the nature and course of disease would enable us to use the old remedial agents in such a way as to get results hitherto impossible.

The researches in the field of physiology during the last year have been important and laborious, and, although many of them are not mentioned in the following pages, because I cannot consider them as yet perfected, the results are such that my successor will, I trust, soon be able to bring to your attention important advances in this very extensive branch of our subject.

The relations and attachments of the muscles of the Eustachian tube have been recently demonstrated very satisfac-

torily by Rüdinger.¹ The tensor-palati muscle is a dilator of the tube; it is inserted along the whole length of the hook of the cartilage, passes forward, inward, and slightly downward, and its fibres spread out along the edge of the soft palate and on the side of the pharynx. In contracting, it draws the hook of the cartilage forward and a little downward, thus enlarging the calibre of the tube. The levator palati takes its origin from the temporal bone just below the osseous tube, and passes along the floor of the tube, some of its fibres arising from the lower end of the cartilage; it is inserted in the uvula, and, in contracting the belly of the muscle which lies along the floor of the tube, becomes thicker: the floor of the tube is raised, and the fibres rising from the cartilage serve to draw the lower end of this away from the opposite wall.

The palato-pharyngeus rises from the posterior part of the lower end of the cartilage, passes backward, and is inserted on the posterior wall of the pharynx. Its action would be to draw the posterior wall of the tube backward; but, as it is often but slightly developed, it probably only serves to fix the cartilage, so that the other muscles can act more effectively.

The opening of the tube is thus the result of the action of these three muscles: the tensor palati, or dilatator tubæ, draws the hook of the cartilage outward, the cartilage becomes less curved and the tube is widened; the levator palati in contracting becomes more horizontal, and draws the lower end of the cartilage inward and upward, thus enlarging the pharyngeal orifice more than 3'''. As soon as these muscles cease acting, the elasticity of the cartilage restores the canal to its former condition.

The papillæ on the dermoid layer of the membrana tympani, first described by Popper as a normal condition, and mentioned in Dr. Roosa's report of last year, are of interest in connection with the polypoid growths which are sometimes found on the surface of the membrane, and which are undoubtedly hypertrophies of these normal papillary projections.

I myself observed the same papillæ in June, 1867, when

¹ Beiträge zur vergleichenden Anatomie und Histologie der Ohrtrumpete München, 1870.

studying the microscopic anatomy of the ear in the laboratory of Prof. Wedl, of Vienna. In thin transverse sections of the membranes taken from two different children, I found "on the dermoid layer opposite the manubrium a row of rounded projecting bodies of different sizes. In many of them an appearance like a nucleus was seen, which could be traced, on changing the focus, as a loop coming from the deeper tissue and passing up on one side of the papilla, there turning and passing down on the opposite side, to be again lost in the deeper tissue. I was unable to recognize any nervous structure, and concluded that these must be loops of capillary vessels."¹ The existence of the papillæ and capillary loops was confirmed by Prof. Wedl, and, if I am not mistaken, by Dr. Josef-Gruber also. In a number of preparations from adult membranes, I was unable to find these papillæ, but my return home, and the subsequent want of material, prevented my continuing the investigation, and the fact is mentioned here as a confirmation of the more thorough investigations of Popper.

Nasiloff² has described, as a new form of inflammation of the membrana tympani (myringitis villosa), a shaggy condition of the dermoid layer of that membrane, which seems to have been an inflammation and hypertrophy of these papillæ. Kessel also accepts this name, and describes³ a condition of the membrana tympani similar to that given by Nasiloff.

Politzer⁴ has demonstrated, by means of an enlarged model of the ear, that the high and low notes of tuning-forks are heard much louder when the membrana tympani is curved by drawing in the hammer, than when the membrane is a plane surface. The view of Helmholtz, that the cause of the resonant power of the membrana tympani lies in the convex curvature of the radial fibres toward the meatus externus, is only partially confirmed by Politzer, since he considers that

¹ MS. Notes, written at the time, in which the description corresponds exactly with that of Popper.

² Centralblatt f. d. Med. Wissensch., 1867, No. 11.

³ Archiv für Ohrenheilkunde, vol. v., p. 250.

⁴ Hauptversammlung der k. k. Gesellschaft der Aerzte in Wien. April 1, 1870.

this curvature only assists the vibratory power of the membrane, and is not the sole cause of it. Politzer's experiments also showed that for increasing the resonance of the membrane it was immaterial whether it was convex or concave in the direction of the sound. He considers that an important factor for the simultaneous reception of different notes is the variable tension of the different parts of the membrana tympani, caused by the inward curvature of the membrane.

In regard to the vibration of the ossicula, Politzer considers that they vibrate not by movement of their separate molecules, but of their whole mass. In a series of experiments in which Lissajous's method was employed, the same used by Dr. Buck, of New York, in his investigations, he arrives at the following conclusions; 1. With an equal intensity of tone affecting the membrana tympani, the intensity of the vibrations of the ossicula is less with the lower than with the higher notes; with the very high notes, however, the intensity again diminishes. 2. By speaking words into the meatus through a tube, the ossicula show as many concussions as there are syllables in the word; and the extent of the vibration is reached with the vowel of the syllable. 3. If parts of the membrana tympani have a ball of wax or a small stick lying against them, the intensity of the vibration of the ossicula is not diminished; if, however, the hammer or one of the other ossicula is thus clogged, the extent of the vibrations is much diminished. 4. While the ossicula are thus clogged, it is observed that their vibrations are relatively stronger with high than with low notes; the vibration from words is less marked than that from musical notes. These results agree with the disturbances of hearing observed from disease. Cicatrices, and calcifications on the membrana tympani, affect the hearing power less than pathological products on the ossicula, which diminish their power of vibration. 5. From artificial destruction of the membrana tympani, the vibrations of the hammer are diminished, but the insertion of an artificial membrane brought into connection with the manubrium again increases them. 6. The jingling in the ear from a strong concussion, first observed by Helmholtz, and considered by him due to the striking together of the teeth of the hammer-incus

articulation, Politzer has observed experimentally, and found to be due to the buzzing of the membrane, and of the ligaments of the ossicula, and he observed the same where the hammer and incus were firmly ankylosed by artificial means.

From laryngoscopic examination of twenty deaf-mute children, from eight to fourteen years of age, Prinz¹ arrives at the following conclusions: 1. Mobility of the muscles which open and close the larynx existed, and the power of vibration of the cords was perfect. 2. From deficient control on the part of the ear a perfect adaptation of the cords did not always follow the attempt to pronounce a vowel, but after instruction this improved. 3. In most of the cases there was a slight catarrh of the cords, referred, by Prinz, to a strain from using unnecessary force.

Meyer,² of Copenhagen, in a communication to the Medico-Chirurgical Society of London, calls attention to an undescribed disease of the nasal and pharyngeal mucous membrane, which, if confirmed by further observation, would seem to have an important bearing on diseases of the ear. He says that frequently, in Denmark, small polypoid growths, or, as he calls them, adenoid vegetations, are met with on the nasopharyngeal mucous membrane. They appear under the microscope to be hypertrophies of the adenoid tissue. They are most frequently met with in scrofulous children, and the functional disturbances most frequently caused by them are deafness, abnormities in the breathing and voice, and impossibility of pronouncing the nasal consonants. The other symptoms are excessive secretion of mucus, appearance of blood in the mouth in the morning, and the feeling of contraction in the nose, as from a foreign body. The objective examination is best made by passing the forefinger quickly behind the palate, when rough, spongy, or velvety irregularities, or long soft masses, can be felt covering the septum of the nose, the choanæ, etc. The only effective means of cure is the complete removal of the growths, either by a small wire-snare, or by cauterization with solid nitrate of silver, or with the galvano-

¹ Archiv f. Heilkunde, iv., p. 413. ² Lancet, December 4, 1870.

caustic. The free bleeding which follows the use of these agents is best checked by the nasal douche.

In 1867, Politzer¹ called attention to the appearances seen on examination when serous fluid was present in the tympanic cavity. Since that time this disease has been more carefully studied, and within the last year two authors, Politzer² and Zaufal,³ have given very full descriptions of the disease and its treatment. Zaufal, from a consideration of the peculiarities of the membrane lining the tympanic cavity, raises the question whether this membrane is not rather a serous than a mucous membrane, the mucous membrane of the pharynx and Eustachian tube becoming a serous membrane in the tympanic cavity, just as the mucous membrane of the uterus becomes serous in passing through the Fallopian tubes. He supports this theory from the fact of the existence in the ear of transparent bands and folds, such as are found in serous but not in mucous membranes; from the normal secretion of the membrane, which is serous, he says; from the absence of mucous glands; and from the ciliary pavement epithelium, such as is found only in the fourth ventricle of the brain. The occasional presence of the so-called mucous corpuscles in the tympanic cavity is due to the throwing off of connective tissue and young epithelial cells from inflammation. Zaufal would recognize three forms of otitis media, serosa, catarrhalis, and purulenta, all of which may be acute or chronic. The first and lowest form of inflammation leads to the secretion of clear serum; an increase in the inflammation causes a hyperproduction of the cell-elements resembling mucus-corpuscles; while a still more intense inflammation leads to a still greater hyperproduction of cells or a real purulent product. All the forms are thus different stages of one and the same process; each may appear independently, but more usually they are intermingled. Until the question of inflammation and the source of the pus-corpuscles has been more satisfactorily settled than at present, these views of otitis must be considered theoretical; the occurrence of serum in the middle ear, however, admits of no doubt, hav-

¹ Wiener Med. Wochenschrift, 1867. ² Wiener Med. Presse, 1869.

³ Archiv für Ohrenheilkunde, vol. v.

ing been observed, *post mortem* and during life, by many observers.

One objective appearance on which Zaufal lays great stress is a depression of the pars flaccida Shrapneli over the small process of the hammer; this, he says, he has found in his dissections a constant accompaniment of spurious ankylosis of the hammer-incus articulation, caused by tense abnormal bands around the joint, and he considers this appearance pathognomonic of such an ankylosis.

The following condensed account of the disease is from the above-mentioned authors, but the original articles are worthy of careful study. The disease is caused either from a closure of the Eustachian tube or the extension of an inflammation of that tube to the tympanic cavity. The appearances, on examination, are variable; the membrana tympani, in cases of closure of the Eustachian tube, is much drawn inward, in other cases in normal position, and occasionally is bulging into the meatus. The first is, however, the most usual condition. The surface of the fluid, when it lies on the floor of the cavity, is seen as a dark line across the membrana tympani, which alters its position as the fluid moves. If the fluid fills the cavity, this line is wanting, and the presence of the serum is recognized by its color. Occasionally the fluid catches in the upper part of the cavity, and appears on the membrana tympani, as it were, in drops. The color of the exudation is either light yellow or reddish. The patients complain of a feeling of closure of the ear, and occasionally of a movement there as of a foreign body, and sometimes of subjective noises. The deafness stands in no relation to the amount of the fluid, but rather depends on its position. The tuning-fork on the head is best heard in the affected ear. The secretion is sometimes spontaneously resorbed, especially in the more acute cases; it may, however, lead to a plastic inflammation of any degree, and the danger of this is greater the longer the duration of the disease. The indications for treatment are the early removal of the secretion and the prevention of its reformation by removing its causes, if such can be found. To remove the secretion, Politzer has modified his method of inflation by directing the patient to hold the head forward and inclined to the oppo-

site side, in order that the fluid may more easily run out through the Eustachian tube, or else he directs him to lie flat on the back during the operation, in order that the fluid may be driven into the mastoid cells. If these methods do not clear the ear, catheterization and the injection of medicaments must be tried.

In some cases, however, the serum is so adhesive that it is necessary to perform paracentesis, and follow this by the air-douche, in order to free the ear.

Lucae¹ has added to our knowledge of the pathological changes of the ear in cerebro-spinal meningitis, by the minute dissection and microscopic examination of the ears in a case which died within thirty-six hours after the beginning of the disease. The hemispheres, base, pons, and medulla, showed a marked purulent inflammation of the pia mater. By the microscope the purulent inflammation of the base of the brain could be followed along the vessels of the acoustic nerves to the cochleæ. The utricles, ampullæ, and canals of the membranous labyrinth, showed purulent inflammation; along their vessels were masses of pus-cells and free blood-corpuscles; the vessels themselves intensely congested and much thickened; the semicircular canals also showed occasional ecchymoses. The tympanic cavities, except a slight injection, were normal. The condition of the ears was nearly the same as that found in the two cases described by Heller,² except that Heller found also a purulent inflammation of the middle ears. Lucae considers that the injection of the tympanic cavities in his case was the beginning of such an inflammation, which was checked by the early death of the patient. The result of the examination of the inner ears showed a genuine inflammation of those parts, and not a simple penetration of the purulent matter from the brain, although Lucae considers it more probable that the inflammation of the brain began first and then set up the inflammation in the ears, than that both began simultaneously.

Having previously heard well, it was found, when the patient entered the hospital, a few hours after the beginning of the disease, that he was then exceedingly deaf, a symptom re-

¹ Archiv für Ohrenheilkunde, vol. v.

² Deutsches Archiv für Klinische Medicin, 1867, vol. iii., p. 5.

ferred by Lucae to the acute purulent inflammation of the internal ears.

Zaufal¹ found a purulent inflammation of both ears, with perforation of both membranæ, in a new-born child, with congenital syphilis. Both perforations were below the manubrium, so that they could not be referred to an arrest of development. The case is interesting, as establishing the fact of the existence of a purulent inflammation with perforation during intra-uterine life. Troeltsch had already mentioned the frequency of perforation in new-born children.

Voltolini² narrates a case of total deafness from a blow on one side of the head; interesting from the fact that the autopsy revealed nearly similar fractures through both petrous bones. A soldier was struck with a stool on the left side of the head, fell senseless, and, on recovering consciousness, was totally deaf. Eleven days after he died, and an extravasation of blood was found around both auditory nerves, the temporal was separated from the sphenoid bone along the suture, and a fracture ran through the roof of the tympanic cavity, the promontory and the porus acusticus internus separating the fenestra rotunda from the cochlea. The same fracture was found in each petrous bone, the only difference being that there was blood in the cavities of the left ear, but none in those of the right.

In a series of dissections of fifteen cases of fatal otorrhœa, Troeltsch³ has added some valuable contributions to our knowledge of pathology and of the course by which these cases become fatal.

In a case of purulent inflammation of one year's duration with polypus, caries of the labyrinth wall of the tympanic cavity had resulted in a fistulous communication through that wall just above the fenestra ovalis, through which the purulent matter had passed into the vestibule and semicircular canals, thence through the internal cribiform plate along the meatus internus to the brain, causing a fatal meningitis of the base of the brain.

¹ Wiener Med. Wochenschrift, No. 28, 1869.

² Monatsschrift für Ohrenheilkunde, No. 8, 1869.

³ Archiv für Ohrenheilkunde, vol. iv.

In another case a polypus from the mucous membrane of the small cavity, a part of the tympanum above the deeper portions of the external meatus, had projected through the bone into the meatus, so that it could easily have been mistaken for a polypus of the meatus.

A third case offers the peculiarity of multiple unconnected abscesses in the brain, one on the side of the ear-disease, and one on the opposite side; the lateral ventricle on the opposite side also filled with purulent matter.

In the sixth case a purulent inflammation of right tympanum, *without a perforation of membrana tympani*, led to a perforation of the roof of the tympanic cavity, phlebitis of the vena mastoidea and transverse sinus with metastasis in the lungs. The membrana tympani was found much thickened, and had thus resisted rupture.

In the seventh case a purulent inflammation of middle ear had destroyed the stapes with the membrane of the fenestra ovalis and through the vestibule caused a pachymeningitis with two abscesses in brain and a phlebitis of the superior petrosal sinus. The phlebitis of this small sinus is explained by the small blood-vessel, which runs inward toward the mastoid process under the superior semicircular canal, entering the bone on the inner surface of the petrous portion, above and between the orifices of the meatus internus and the aqueductus vestibuli. This vessel was first described by Odenius,¹ and in two cases he was able to follow it into the superior petrosal sinus, so that we have here the circulation of the middle ear in new direct communication with this sinus.

Voltolini's investigations on the development of this passage were noticed in Dr. Roosa's report of last year.

The time at which the brain-symptoms showed themselves in the cases of abscess of that organ is interesting; in one the time was nineteen days, in another eight days, and in a third only thirty hours, before death.

Wreden² gives a case of external and internal hæmorrhage from a perforation of the right transverse sinus, the result of purulent inflammation of the right tympanum. The patient, a

¹ Medicinsk. Archiv, vol. iii., No. 4.

² Monatschrift für Ohrenheilkunde, 1869, No. 11.

soldier, in hospital, with supposed typhus abdominalis, began to complain of severe headache, without delirium, six weeks from the beginning of the disease. This symptom continued without the ears being suspected, for two weeks, when suddenly there was excessive venous hæmorrhage from the right ear, which could not be wholly checked. From this time vertigo and congestion of conjunctivæ were noticed, and three days after, with delirium and singultus, he died. The autopsy revealed an inflammation of meninges on that side with much blood and pus in cranial cavity; a phlebitis of transverse sinus with thrombus, which extended down into the bulb of jugular vein and into the veins of neck; the thrombus in parts showed purulent degeneration. A perforation, size of a pin, was found in transverse sinus just where the superior petrosal sinus enters, and in its outer wall another, where a considerable opening in the sinus and sulcus communicated with the mastoid cells. The whole of sulcus transversus and the mastoid cells were carious; there was no caries of the other bones around the ear. Middle ear was filled with blood-clots, and showed an old purulent inflammation with destruction of membrana tympani. Internal ear was filled with purulent matter. The caries was confined to mastoid process, and the case is interesting from the double perforation of the sinus, within and without, and from the inflammation of the sinus having been mistaken for typhus fever, as Lebert¹ has remarked is often the case. Wreden adds a synopsis of eighteen cases of such perforations from various authors, in none of which was there a double opening as in his case.

Dr. Robert Law, in the *Dublin Quarterly* for May, relates two cases of vicarious discharge from the ears in females: the first, a woman of twenty-one, was admitted to the hospital, complaining of violent pain in the head. The menstrual discharge had been suppressed for some months, and ever since she had complained of pain in each ear, and a sense of fulness in head, strong beating of temporal arteries, flushed face, and cold feet. On the first night after admission, she had a large hæmorrhage from each ear. The treatment adopted was to divert the blood from the head to the uterus, and to strengthen

¹Virchow's Archiv, vol. ix., p. 401.

the constitution ; leeches were applied behind the ears, hot foot-baths and aloetic purgatives given, but the hæmorrhage from the ear recurred on the third night. The treatment had little effect, the hæmorrhage from the ears was frequent and preceded always by weight in the head, pain in the ears, throbbing of temporal arteries, flushed face, and cold feet ; all relieved as soon as the hæmorrhage had taken place. During a period of several months she had three attacks of erysipelas of the face. After a very profuse bleeding from the ears, she improved so much that she was advised to leave the hospital, but returned in a month. Twice during the next four months she bled from the ears, and discharged frequently large quantities of dark grumous blood from the stomach. A month and a half after that she had the most copious hæmorrhage from the ears, "the sheets were literally soaked in blood," and she now announced that about one month before there had been a slight appearance of the menstrual discharge. She ultimately got quite well, but not till the menstrual discharge was restored. No mention is made of the condition of the ears before, during, or after, and no examination seems to have been made ; the state of the hearing is nowhere mentioned. If the drums had been partially or wholly destroyed, and the mucous membrane of the tympani exposed, the case would somewhat resemble a hæmorrhage from the nose, although we are at a loss to find a reason for the congestion taking place only in the two tympani. If we presuppose healthy ears, the discharge must have come from the epidermis, and that this should happen in such quantity as is mentioned seems impossible.

In the second case, that of a servant-girl, aged thirty, there were hæmorrhages from the eyes, epistaxis, hematemesis, a serous discharge from the ears, profuse lachrymation and perspiration, without, however, menorrhagia, the menstrual discharge being normal in time and quantity ; these symptoms appeared at the menstrual period ; the natural discharge apparently not being sufficient to relieve the system. No examination was made in this case, and we are not even informed whether the ears at this time performed their functions normally. The final result of the case is not given.

De Rossi¹ observed a case of vicarious menstruation in a patient suffering from purulent inflammation with a small polypus from the tympanic cavity. The inflammation in the ear began three years before, and from that time at every menstrual period there was a free discharge of blood from the ear, which continued four or five days, and then ceased, to return at the next period. After removal of the polypus, and cicatrization of the membrana tympani, the menses became normal, and the hæmorrhage from the ear ceased.

An unusual case of hæmorrhage from the ear is narrated by Hedinger² under the title "Apoplexy of the Middle Ear." A plethoric man, forty-five years old, after a hearty meal, suddenly felt intense pain in the left ear, accompanied by severe vertigo. This lasted till midnight, when suddenly several spoonfuls of blood were evacuated. The next morning there was an S-shaped rupture in the middle of the membrana tympani, with an ecchymosis around it, but no general congestion of the membrane; the manubrium was invisible, the walls of the meatus covered with blood. For the next few days there was frequent epistaxis and some fever. Three days after the hæmorrhage there was a purulent discharge from the ear, which under treatment ceased in about ten days. Several chills occurred during the illness. About two-thirds of the membrana tympani was destroyed by ulceration; the hearing for the watch and voice was completely lost from the beginning, and on the fourteenth day there was no improvement in this respect.

In 1869, Schwartz³ published a number of cases of syphilitic affections of the ear, and recently Gruber⁴ has given a short monograph on the pathology of these diseases.

A primary syphilitic sore in any part of the ear he has never seen; secondary eruptions, however, on the external parts of the ear have been frequently under observation, particular parts of the ear favoring particular forms of eruption.

¹ Gazette des Hôpitaux, No. 110, 1869.

² Med. Corresp. Blatt. des Württemberg Aertzl. Vereins xxxviii., Nos. 9 and 10.

³ Archiv für Ohrenheilkunde, vol. iv.

⁴ Wiener Med. Presse, Nos. 1, 3, 6, and 10, 1870.

The point of insertion of the auricle and the lobule show most frequently a papular eruption, the other parts of the auricle an exanthematous eruption.

The external meatus, on account of the number of glands and papillæ in the skin, offers a particularly favorable condition for the development of condylomata, which, on account of the contraction of the meatus, easily spread so as to completely close the passage. The development of these condylomata is often exceedingly rapid, so that on examination the membrana tympani is hidden, and only masses resembling granulations can be seen.

The squamous eruptions are found on the auricle, but Gruber does not remember to have seen them in the meatus. None of the eruptions on the auricle offer any thing peculiar; those in the meatus, however, interfere with the functions of the ear, and also offer in their course certain peculiarities. In the deeper parts of the meatus it is very rare that a single condyloma is seen, but the course of the disease resembles more that seen on mucous membranes, and the eruption appears like plaques muqueuses. At the same time there is a loosening of the epidermis and the exudation of a sero-purulent fluid, which becomes gradually thicker from the intermixture of epithelial cells, till finally the disease exactly resembles an otitis externa. The swelling in the narrow space of the meatus also causes severe pain. The extension of the eruption on to the membrana tympani resembles the common acute or chronic inflammation of that membrane, and may cause perforation.

Non-specific inflammations of the ear in persons with constitutional syphilis have a marked tendency to ulceration; and circumscribed inflammation of the meatus, which usually after the evacuation of the pus heals rapidly, in syphilitic persons is very apt to form painful and obstinate ulcerations. Grumous tumors may form in either the osseous or cartilaginous meatus, but are most frequent in the cartilaginous portion. They may be painless, and disappear under a constitutional treatment alone, or by ulceration become exceedingly painful, and require a long local treatment.

Ulceration of the meatus and membrana tympani may be

primary, as already described; or secondary, as the result of a similar process in the middle ear.

Some of the exostoses Gruber does not hesitate to consider of syphilitic origin, as he has seen them develop in the meatus at the same time that syphilitic exostoses on other bones were developing. He is far from considering that all, however, have such an origin. Contrary to the rule in other parts of the body, they are usually painless in the ear. He has observed and described¹ several cases where such an hyperplasia of the bone of the meatus was associated with a similar affection of the osseous portion of the Eustachian tube.

As would be expected from the frequency of syphilitic disease of the mucous membrane of the throat and nose, the mucous membrane of the middle ear is the most liable of all the parts of the ear to be affected. Mucous papules may appear in the Eustachian tube and tympanic cavity; may heal spontaneously or ulcerate, and cause great destruction. Where the membrana tympani is involved in the ulceration, there is great pain, which continues till the ulcerative process is checked, although in other non-syphilitic inflammations the pain ceases as soon as the membrana tympani is perforated. The most frequent form of ulceration, however, is due to a direct extension of a pharyngeal ulceration into the ear, and its results in the ear may be the same as those from a common otitis media.

Periostitis of the mastoid process following otitis media, without a perforation of membrana tympani or any otorrhœa, Gruber has found very frequent in syphilis, and he suggests that the lymphatic swellings in this region are rather due to an irritation of these glands from the inflammation in the ear than to the general disease. The whole course of the otitis in a syphilitic person is more chronic than in other persons, but the results are the same as from an equal amount of ulceration without this specific cause.

The hypertrophic form of otitis is particularly common in syphilis, but offers no peculiarities except a marked tendency to the formation of pseudo-membranes and polypoid growths in addition to the development of connective tissue in the substance of the mucous membrane. Occasionally there is seen

¹ Lehrbuch der Ohrenheilkunde.

an hyperplasia of the bone within the tympanic cavity either in spots or over a large surface, and complete ankylosis of the stapes may result from such growths.

The appearances found in the inner ear in syphilis have been mostly the results of disease in the middle ear. Hyperæmia of the middle ear is accompanied often by a like hyperæmia of the labyrinth which predisposes to an extravasation of blood, and such extravasation Gruber considers as probably the cause of sudden and total deafness. He also suggests that in syphilis an inflammation with exudation in the labyrinth may come on suddenly in a previously-healthy ear, and says that one dissection which he has made supports this view.

In closing, Gruber cautions against trusting to remove the disease of the ear by treating the constitutional affection only; although he would not neglect the general treatment, he considers that local treatment is necessary for a perfect cure.

For thoroughly cleansing the deeper parts of the meatus in cases of purulent discharge, Plat¹ has constructed a sort of double-current catheter which would seem to answer the purpose admirably. It consists of an L-shaped tube, one end of which is covered with rubber to be inserted air-tight into the meatus externus. Into this large tube a small straight tube is inserted throughout its length. The water from a douche, entering the end of the smaller tube, fills the meatus, circulates around this, and passes out through the larger tube.

Gottstein² recommends pressure in otitis externa where the meatus is narrowed. He directs that a compressed sponge be inserted as deep as possible into the meatus, and on this that warm water be dropped; the sponge to be left in for six hours, and to be moistened with water every two hours. Usually only one application is necessary. He claims that the disease in all cases is shortened and in many is immediately checked.

In two articles of real practical value³ Lucae gives his methods of treating chronic purulent inflammation of the tym-

¹ Bull. Gén. de Thérapeutique, May 30, 1869.

² Berliner Klinisch Wochenschrift, No. 43, 1869.

³ Monatschrift f. Ohrenheilk., No. 4, 1870. Berliner Klinisch Wochenschrift, No. 6, 1870.

panum. In the majority of these cases he has found that they were accompanied by granulations, not only in the middle ear but along the Eustachian tube and in the pharynx, and this condition of tube and pharynx keeps up the inflammation in the ear. He directs treatment more especially to the Eustachian tube, and has seen the best results from the insufflation of dry powders through the catheter into the tube. For this purpose he recommends muriate of ammonia, sulphate of zinc, alum, acetate of lead, and sulphate of copper. The addition of a small amount of camphor to any of these he thinks is of advantage. The powdered sulphate of copper is the most valuable in granular pharyngitis. The advantages of the powder over strong solutions are, that we get the greatest action in the tube where it is needed, without the risk of inflammation of the tympanum from the unexpected entrance of considerable quantities of fluid. Where only a very mild action is required, Lucae prefers the injection of liquids by Gruber's method. For the granulations in the tympanum, sulphate of copper in substance or solution (from two to five grains to an ounce) is highly recommended.

One cause of the frequent failure to cure in these cases is the insufficient or imperfect application of the astringent instillations. To remedy this, Lucae uses what he calls a prolonged ear-bath, by means of which he keeps the solutions applied to the desired parts for any length of time, without interfering with the occupation of the patient. A medium-sized glass tube is bent at a right angle, with a long arm about one inch in length, and a short arm about one-half inch in length. The long arm is covered with rubber tubing, and inserted tightly into the meatus; into the shorter arm, which stands upright, the solution is instilled drop by drop, till the tube is nearly full. The patient is now able to move about, and the solution can be thus retained as long as desired. Previous to these applications the ear is to be thoroughly cleansed by the double current of Plat, already described. At first, the solution is retained for half an hour twice a day, but the length of time can be increased to several hours if desired.

Gruber¹ mentions a pruritus cutaneus of the meatus, the symptom of which is an intense itching of the meatus, without any other objective or subjective symptom. It comes on most frequently in persons of middle life, who have some disturbance of circulation. The affection was first noticed and described by Hebra. Gruber recommends, as palliative, watery and oily instillations into the meatus, and for radical cure the repeated painting of the part with a solution of argenti nitratas, one part to six or eight of water, till reaction takes place.

Dr. F. E. Weber² recommends, for the constant and severe itching and tickling in the ears, the instillation of spiritus vini in the meatus. Spiritus vini (eighty to ninety per cent.) to be instilled morning and evening into the meatus till it is filled, and to be retained for five minutes; the ears afterward to be protected carefully from cold, in order to avoid the risk of furuncular inflammation. He says that, in from three to five days, the trouble is entirely relieved. Occasionally a minute portion of sublimate, or a mixture of white precipitate and camphor, is added to the alcohol. He considers the same application the best means of checking an otitis externa, if seen before suppuration or furuncular inflammation has set in. In several cases he makes the application thrice daily; in slighter cases only twice, in the same way as above.

Schwartz³ recommends the galvano-caustic for the destruction of granulations in the meatus and tympanic cavity, and states its advantages over other caustics to be: 1. The short duration of the necessary treatment; 2. Short duration of pain; 3. The relatively greater certainty of the result. He has never seen any irritation of the brain or other disadvantage follow the operation, and has seen one old perforation close after it. Once, after removal of a hard, fibrous polypus, which completely filled the meatus, erysipelas of face and a cicatricial contraction of meatus followed.

Jacoby⁴ also claims excellent results from the galvano-caustic treatment of new growths in the ear, and in his article

¹ Allg. Wiener Med. Zeitung, No. 52, 1869.

² Berliner Klinisch Wochenschrift, No. 20, 1870.

³ Archiv für Ohrenheilkunde.

⁴ Archiv für Ohrenheilkunde, vol. vi., Part I.

on the subject gives minute directions for the technical application. The treatment of a case of very hard fibroma of the meatus, complicated with chronic periostitis of the mastoid process and chronic purulent inflammation of the middle ear, with perforation and polypoid growths of membrana tympani, is given minutely. The patient, a girl, fifteen years old, had had an otorrhœa for four years. When first seen, there were great inflammation and pain over the mastoid process, a profuse and fetid otorrhœa, and the meatus was completely filled by a very firm growth from its posterior wall. This growth was so firm that it was found impossible to remove it by Wilde's snare, and the treatment by galvano-caustic was undertaken. The result was most satisfactory, and, after some twenty-one applications of the galvano-caustic and the occasional use of laminaria to dilate the passage, the walls of the meatus were free from any abnormal growths, the discharge had ceased, the membrana tympani became normal, and some two months after the last cauterization the perforations were nearly closed, and there was no sign of a recurrence of the growths. During the treatment, the patient had an attack of measles, and during this, for the first and only time, there were symptoms of meningeal inflammation and an increased inflammation of the mastoid process, but both yielded readily on the application of leeches.

Other cases of a less severe and obstinate form are given, viz., a soft polyp from the meatus removed partially by Wilde's snare and the residue destroyed in three applications of the galvano-caustic; two cases of polypoid degeneration of membrana tympani permanently cured, the one in seven applications, the other in one.

The appearance, in 1868, of Brenner's very thorough and scientific investigations¹ on the reaction of the auditory nerve to the constant electric current has called forth various opinions from writers; while Schwartze,² Schwanda,³ Bettel-

¹ Untersuchungen und Beobachtungen über die Wirkung Elektrischer Ströme auf das Gehörorgan. Leipzig, 1868.

² Archiv für Ohrenheilkunde.

³ Oester Med. Jahrb., xxiv., p. 163.

heim,¹ and others, have denied Brenner's results in the most emphatic manner, Erb² and Hagen³ have confirmed them by series of careful experiments. In a supplement to the second part of Brenner's work, which appeared last year, it is clearly shown that his opponents had not used the cautions on which he lays particular stress, and consequently that they had not fairly tried his method.

Such being the case, and with the results of Erb and Hagen before us, the method deserves further trial, especially as Moos⁴ gives full particulars of a case of nervous deafness from cerebro-spinal meningitis which was greatly benefited by the constant current applied in Brenner's method. On the third day of the disease, the deafness of the patient had become complete; on the thirteenth day she began to hear somewhat, and at the end of a month could understand words spoken directly into the left ear; and some time after she could understand at the distance of one or two feet from the left ear. The right ear remained totally deaf. For the next year there was no further improvement, although the ears were treated by catheterization, vapors, etc.

The examination by Prof. Moos, with the constant current, gave a negative result in the right ear; in the left ear, however, the subjective noises were much diminished by AD IV, and the hearing was improved, for the voice from two to six paces and for the watch from three to six feet. After four applications of XI 160 AD the voice was heard at fifteen paces, the subjective noises were much diminished, and the head-symptoms disappeared. The subsequent applications produced no further improvement. Considering the utter uselessness of all previous therapeutic agents in such cases, the result here may be considered encouraging and a still further recommendation of Brenner's method of application.

It has been known for some time that, for testing the conduction through the bones of the head, the dominant note of the tuning-fork only was useful, and that the over-notes inter

¹ Wiener Med. Presse, 1863, No. 23.

² Archives of Ophthal. and Otology, Part I.

³ Pratische Beiträge zur Ohrenheilkunde. Leipzig, 1866-'69.

⁴ Archives of Ophthal. and Otology, Part I.

ferred very materially with the test. Politzer¹ has found that by small metallic clamps attached to the ends of the vibrating arms of the fork, only the dominant is obtained, and by the use of such clamps he claims that the patients can give a much more decided answer in regard to the place where the sound is heard than is possible for them with the simple fork.

The clamps are made to surround three sides of the prismatic arm of the fork, and are fastened by means of a small screw. The note of the fork is also raised by these clamps so that when they are fastened on the ends of a fork C the tone is raised to the fourth above, F; as the clamps are carried downward, the tone becomes higher and higher through a whole octave, so that it is possible, by altering the position of these clamps, to get all the tones up to an octave above the musical fourth of the fundamental note of the fork.

Besides the articles in the medical journals and several pamphlets, many of which have been quoted, two works have appeared in the last year so full and original that it is impossible to give a *résumé* in this place. Rüdinger has published the results of his investigations on the comparative anatomy and histology of the Eustachian tube, with chromo-lithographic illustrations from microscopic photographs. Gruber has published a complete treatise on the diseases of the ear, with beautiful woodcuts of the anatomy and pathology, and two tables of chromo-lithographs of the membrana tympani. The work is particularly valuable for its accurate clinical histories, the arrangement of its anatomical descriptions, and for its microscopic investigations. Both will be found of great value to the student, the practitioner, and the teacher.

¹ Wiener Med. Presse, No. 13, 1870.



